ENGINEERING CASE LIBRARY

ECL 244

THE MISANTHROPIC MIXER

This case follows the investigation into a batch mixer that injured two men by starting when they were cleaning it. The situation, technical background, and questions relating to the incident are also given.

Names, but not facts, have been changed.

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Appreciation is expressed to Mr. John J. Higgins, of Eisenstatt, Higgins, Kinnamon, Okun & Stern, Omaha, Nebraska, for permission to use his files in writing this case.

THE MISANTHROPIC MIXER

PART A

The Circumstances

JONES Special Feeds was a supplier of processed feeds for livestock. In essence, JONES brought grain into the mill, added vitamins and/or other pharmaceutical products, bagged it and sold it to farmers. Additives were introduced by placing them in a batch of milled grain in a mixer, running the mixer until mixing was complete, and then rebagging through a weighing-bagging device.

When the entire batch had been removed, the mixer had to be thoroughly cleaned so that one batch would not adulterate the following batch. Cleaning was accomplished by workmen using hand brushes to sweep the mixer clean.

On 3 September 1974, Bill Back and Mike Dark were cleaning the mixer when it started rotating. Both were injured. Bill Back suffered a severe compound fracture of both bones of his right forearm with extensive loss of skin, muscles, ligaments, and other soft tissues of his right arm. These injuries resulted in 75% permanent disability of his right arm. At the time of the accident, Bill had been working for JONES for about seven months. He was barely over 19 years old. Mike Dark suffered a compound fracture of the femur of the right leg along with other painful injuries. Later medical treatment required rebreaking and resetting of the leg. He suffered a permanent injury of 15% to his right leg. Mike had been working for JONES for six days. He was 18 years old.

Both men instituted suit against ROSY Machinery Company. Initially, these were separate suits. At a later date, these two actions were combined, at the request of ROSY, with Back's attorney, Mr. Blue, representing both Back and Dark.

Background Information

On 14 November 1973, ROSY sent a sale quotation to JONES for a mixer. A general description of the mixer is given in Exhibit A1 with further advertising material in Exhibit A2. The quotation was for a Model 3130 mixer (See Exhibit A3 for some details). An order was placed and fabrication of the mixer was started on 20 January 1974. Shipment to JONES was made on 6 February 1974. An invoice for $3851.50 was dated 7 February 1974. Installation of the mixer was made by JONES or subcontractors hired by JONES. ROSY Machinery had been making mixers of this general style since the early 1940's. ROSY had also supplied two mixers of this style to JONES in 1969.

The specific mixer was located on a balcony (See Exhibit A4 for layout sketch) as mixer #3. Exhibit A5 shows the specific mixer with the covers

lifted. The general arrangement of the section of the mill around the mixer area is shown in Exhibits A6 and A7.

The mixer was placed in the balcony so that its cover was flush with the floor of the balcony. Power was supplied to the mixer through a wall box with a lever switch. In addition, there was the switch whose location was shown in Exhibit A4. This switch was a toggle switch of the variety found in homes, office buildings, etc., which can be purchased in any hardware store. The mixer could also be controlled by a switch available at the weighing-bagging stand. This switch was a plug-in unit and moveable, i.e., at the end of a rubber covered cable, and contained in a box with three buttons for start, "inch" or "jog", and stop. (Exhibit A8) The locations of the two switches, i.e., the toggle switch and the plug-in box, were not visible from each other.

Accident Situation

Bill Back and Mike Dark were cleaning mixer #3 when it started rotating. It appears that a third worker turned on the power by flipping the toggle switch which controlled mixer #3. This third worker claimed he thought he was turning on mixer #4 which he was using to mix a batch of grain.

Plaintiffs' Claims

A claim of breach of express and implied warranty was made on the basis that ROSY Machinery Company was in the business of making such mixers, knew how its product would be used by members of the public, and that it warranted that its product was reasonably fit for the purpose and use intended and was of merchantable quality, when in fact, the product was not reasonably fit for the intended purpose and not of merchantable quality.

A further claim was made of careless and negligent design and manufacture by failing to provide the mixer with an interior barrier guard or safety interlock device to prevent employee contact with the rotating agitator of the mixer, and in failing to provide adequate warning notices on the mixer.

A further claim was made of strict liability on the part of ROSY Machinery since it sold the mixer in a defective condition which was unreasonably dangerous to its users and that the mixer was in the hands of the ultimate consumer and was being used without substantial change in the condition in which it was sold.

Bill Back sued ROSY for $200,000. His wife sued for $50,000 on the basis of loss of consortium. Mike Dark sued for $100,000.

Response by ROSY Machinery Company

ROSY denied that it was negligent or had breached any express or implied warranty. In response to some of the specific details of the complaint, ROSY alleged that it was without sufficient knowledge or information to form a belief as to the truth of the matters alleged and, therefore, denied plaintiffs' allegations.

In defense, ROSY claimed that plaintiffs' negligence was the cause of the injuries. In addition, ROSY claimed that the plaintiffs knew, or should have known, of the dangers and thus voluntarily and unreasonably encountered these dangers, thereby assuming the risks. Further, ROSY claimed that there was no material which constituted express warranties and, in any event, there was no direct contractural relationship between the plaintiffs and ROSY. In effect, ROSY Machinery claimed that the plaintiffs had no case against ROSY.

Questions

1. In your opinion, is ROSY responsible for the injuries to Back and Dark?

2. What arguments can you develop for, and against, ROSY's liability?

3. What comments do you have about the physical arrangement of the mixing-weighing-bagging section of the mill?

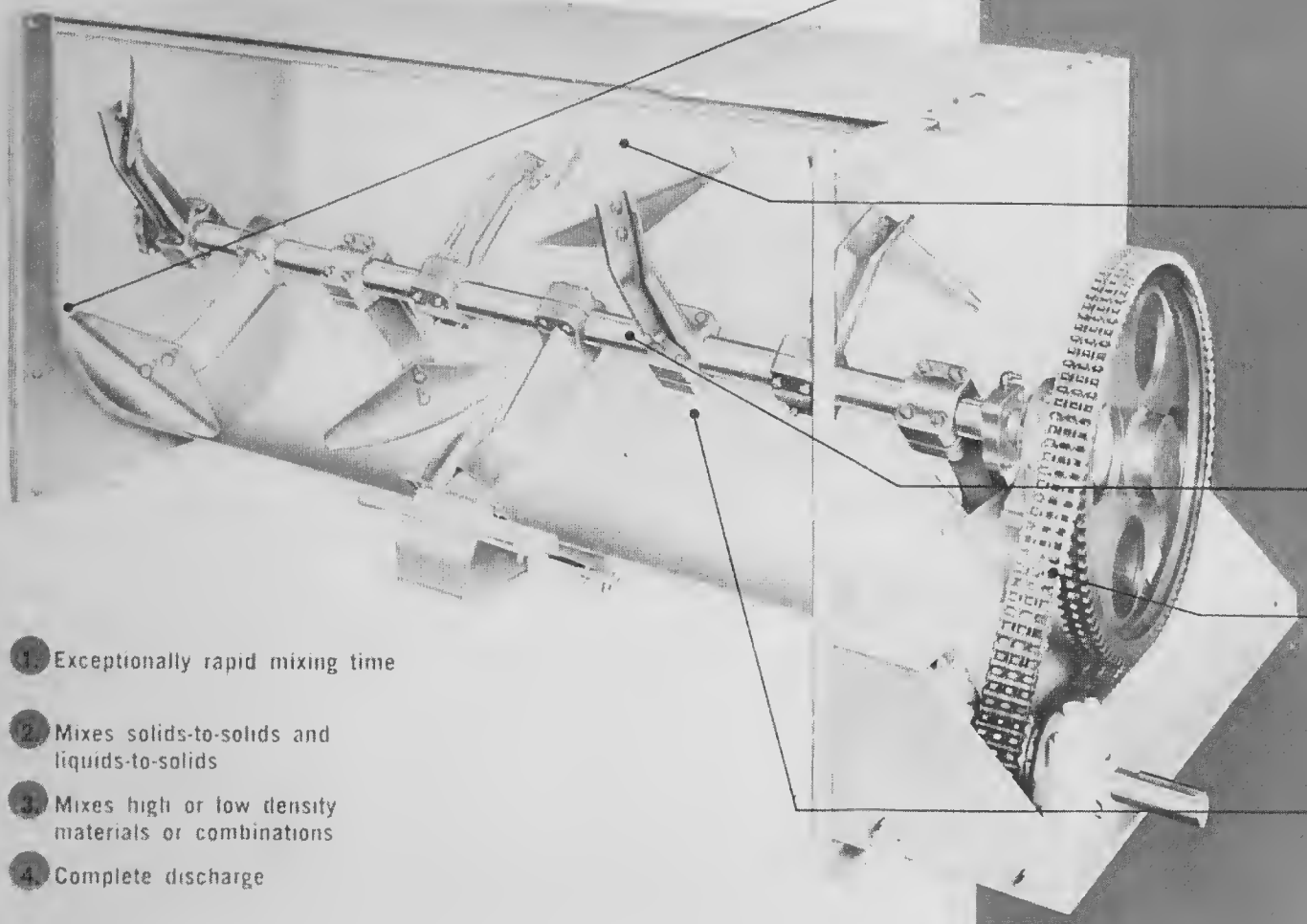
4. What comments do you have about control of the mixer while it is operating or being cleaned?

5. Can you reach a decision on what action should be taken on resolution of these claims? If not, what further investigation would you perform?

6. In your opinion, is this mixer (a) designed, (b) manufactured, (c) installed properly, with specific reference to safety?

7. If your answer to any part of No. 6 is no, indicate the deficiency and what you would do to correct it.

THE [redacted] MIXER . . .
AN EXCLUSIVE DESIGN



1. Exceptionally rapid mixing time
2. Mixes solids-to-solids and liquids-to-solids
3. Mixes high or low density materials or combinations
4. Complete discharge

CLOSE BLADE TOLERANCE

Each paddle blade is set to the bottom center of the mixer at a tolerance of approximately .020"-.030" and the adjustable feature allows this close blade tolerance to be maintained throughout the life of the mixing equipment even when mixing heavy abrasive materials.

CROSSBLENDING ACTION

The exclusive [redacted] curved and canted paddle blades scoop, lift, and tumble materials in a "figure 8" mixing action. The paddle blades overlap each adjacent blade, insuring no unmixed pockets. All materials are kept moving all of the time. The paddle blade also creates a cavity, into which material flows to create a turbulent upward and downward action. This mixing action is intense, yet gentle.

HIGH STRENGTH SOLID SHAFT

The solid shaft has a high tensile strength, precision keyweyed for correct arm position and all-important sequence.

MULTIPLE-STRAND ROLLER CHAIN DRIVE

This drive provides an economical, quiet and efficient drive. A multiple V-belt drive is used from the motor to the countershaft. Shaft-mounted and foot-mounted gear reduction drives are also available.

PADDLE ARM CONSTRUCTION

Cast malleable arms are bolted and keyweyed to main-shaft.

Additional construction features will be found on succeeding pages.

Exhibit A1 -- Page 5A of manufacturer's catalog.

Why is the [redacted] Mixer a Better Mixer?

1 The adjustable paddle blade provides mixing accuracy, thorough clean-out.

This blade allows a closer tolerance to be maintained between the mixing agitator blade and the mixer shell. This close tolerance assures accurate mixing and thorough discharge of materials.

The adjustable blade means that this close tolerance can be maintained throughout the life of the mixing equipment. The [redacted] Mixer will mix as accurately 20 years after installation as it did on the day it was installed. It is capable of mixing micro-ingredients with large amounts of basic ingredients.

2 The paddle blade provides versatility

The unique curved paddle blades scoop, lift and tumble materials as they are conveyed to the center of the mixer, where they are continuously over-lapped and cross-blended in a "figure 8" mixing action. Each paddle blade creates a cavity in the material as it passes through it.

In addition to the cross-blending action, you secure a turbulent upward and downward movement that provides the intense type of action required to blend liquids and solids. The intense action is, however, a gentle action and does not tend to break up or grind particles as other types of agitation will tend to do.

The mixing action also allows the mixing of full or partial batches and the [redacted] Mixer does not need to be filled to any specific level to achieve homogenous mixing.

3 Versatility provides a wide range of applications

The exclusive design and paddle blade mixing principle found throughout the complete line of [redacted] Mixing equipment allows the mixer to be used for a variety of mixing or blending applications.

[redacted] Mixers provide unequalled mixing accuracy on dry materials. Liquid additives including molasses, fish solubles, animal fats, can be blended with dry materials.

The [redacted] Mixer can also be used as a live bottom bin. It is a very effective agitated holding bin because of its gentle mixing action and for its ability to handle either dry or sticky materials. The [redacted] Mixer can also be used as a cooling, heating or drying chamber.

4 Simplicity of construction provides trouble-free performance

It also provides ease of cleaning, ease of maintenance, economy of operation, dependability and lack of obsolescence (standard parts are available for all [redacted] Mixers manufactured in the last 30 years, and for many units prior to that date.)

5 General over-all design provides customized construction features at assembly line prices

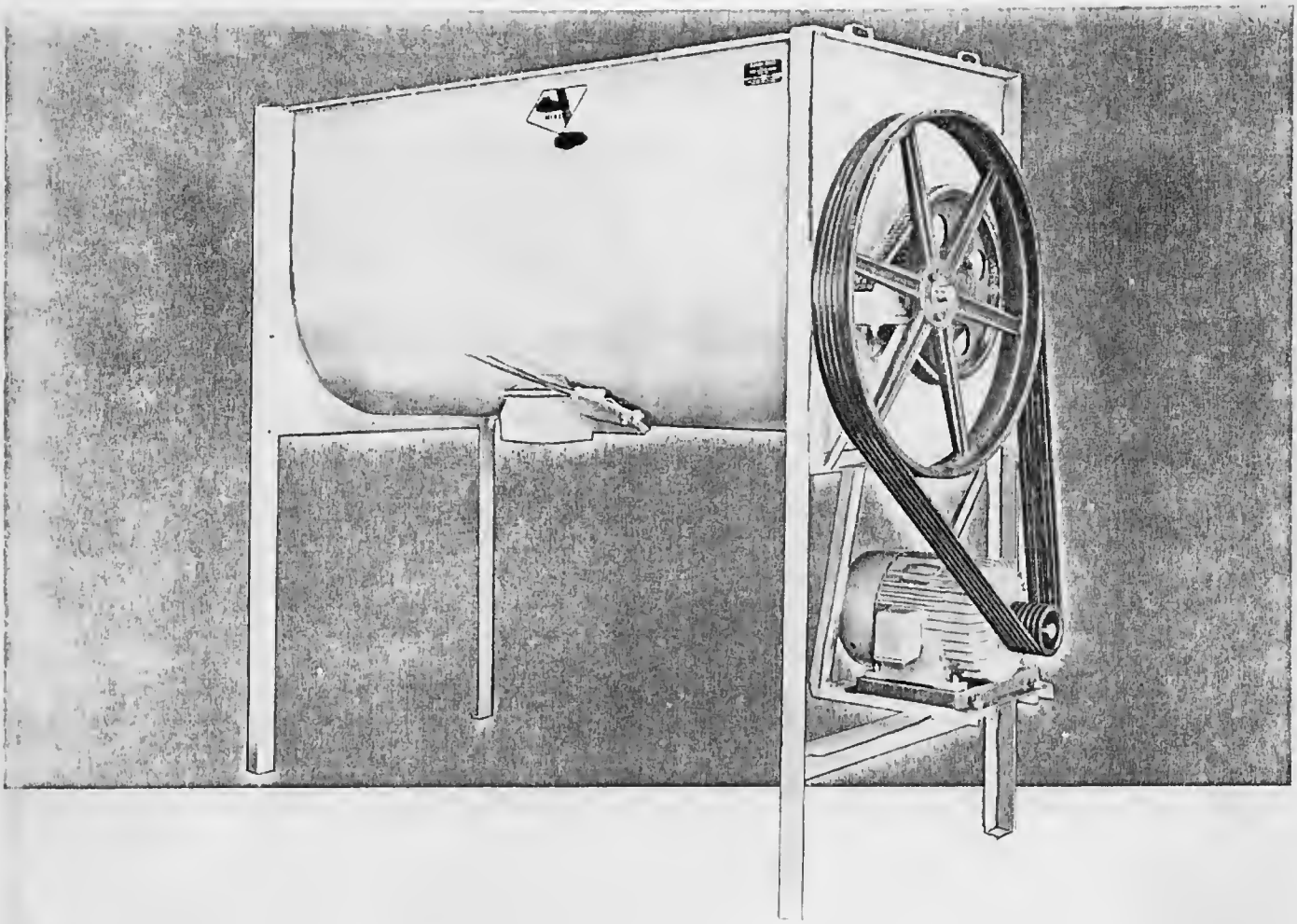
[redacted] Mixers can be custom designed to fit your requirements, yet the economy of assembly line fabrication is retained due to the use of interchangeable component parts. A wide variety of sizes and types of construction are available. The discharge can be placed on either side of the unit, the drive at either end, overall height and length can be adjusted to meet existing space requirements, etc. In addition, a wide variety of discharge valves, shaft seals, covers, etc. are available.

6 Company policy provides personalized service

[redacted] Machinery Company has specialized in the manufacture of horizontal mixing equipment for over 40 years. Complete research, engineering and product development are devoted exclusively to horizontal mixing equipment. And you will enjoy the old-fashioned personalized service that prevails (so often lost in today's computerized business world.)

You can rely upon [redacted] Machinery Company for the best possible service with regard to quotations, mixer deliveries, parts service, etc. Qualified sales and engineering services are available in most areas of the United States, Canada, and other parts of the world.

Exhibit A2 -- Page 4 of manufacturer's catalog.



[redacted] Standard Mixers are designed for applications involving the mixing of dry, free-flowing, non-abrasive or mildly abrasive materials. They can also be used for the blending of minor amounts of liquid additives. These mixers are rugged and dependable, and will provide years of mixing and blending service.

[redacted] Standard Mixers come in four sizes, featuring ball bearing construction throughout. They are available in mild steel, stainless steel and sanitary construction.

SPECIFICATIONS

MODEL	SIZE LBS. *	RATED CAPACITY		O.A. HEIGHT			O.A. LENGTH W/STD. DRIVE	O.A. WIDTH		INSIDE DIMENSIONS		STD. RPM		H.P. REQ'D†		STD. DISCHARGE GATE SIZE	APPROX. WT. MIXER ONLY
		TOTAL CU. FT.	MAX. MIXING CU. FT.	W/O LEGS	W/STD. LEGS	DISCH. CLEARANCE		DRIVE END W/O SHEAVE	END OPP DRIVE	DIA.	LENGTH	MAIN SHAFT	COUNTER-SHAFT	DRY FREE FLOWING	W/LIQUIDS OR HEAVY MATERIALS		
3010	1000#	41	32	48	80	32	68	45½	45½	36	48	38	260	7½-10	—	8x8	1292
3020	1000#	41	32	48	80	32	68	45½	45½	36	48	38	260	7½-10	10-15	8x8	1342
3050	2000#	82	63	48	80	32	116	45½	45½	36	96	38	260	15-20	—	8x8	1636
3060	2000#	82	63	48	80	32	116	45½	45½	36	96	38	260	15-20	20-30	8x8	1736
3080	3000#	135	100	54	86	32	144	51½	51½	42	120	38	260	20-30	—	10x10	2303
3100	3000#	135	100	54	86	32	146	60½	51½	42	120	38	260	20-30	30-40	10x10	2516
3120	4000#	162	125	54	86	32	170	60½	51½	42	144	38	260	30-40	—	10x10	3305
3130	4000#	162	125	54	86	32	170	60½	51½	42	144	38	260	30-40	40	10x10	3505

All dimensions in inches.

All data is approximate. Request prints for installation requirements.

REFER TO "CONSTRUCTION FEATURES" (p. 13-15) FOR OTHER CONSTRUCTION DETAILS.

* Based on materials weighing 32#/cu. ft.

† H.P. is approximate, and can vary according to nature of materials.

Exhibit A-3 -- Page 9 of manufacturer's catalog.

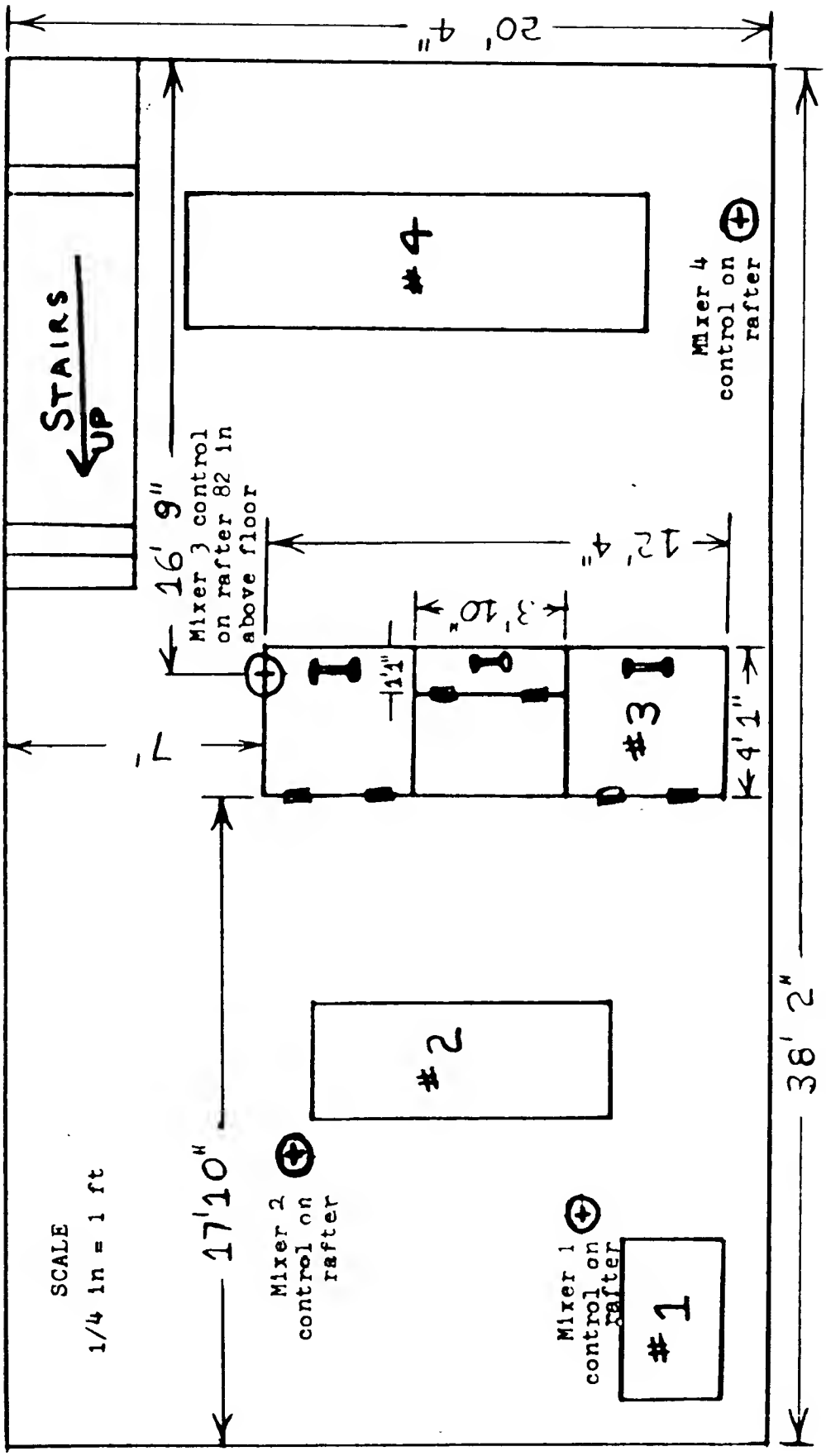


Exhibit A4 Layout of floor plan of balcony in mixer area of mill

Exhibit A5 -- Top view of mixer #3 with cover open (cover to right of mixer). Taken looking toward front of balcony.

Exhibit A6 -- View of mixer operations area showing balcony and guard rail, four mixers, fork lift truck, and sacked grain on pallets.

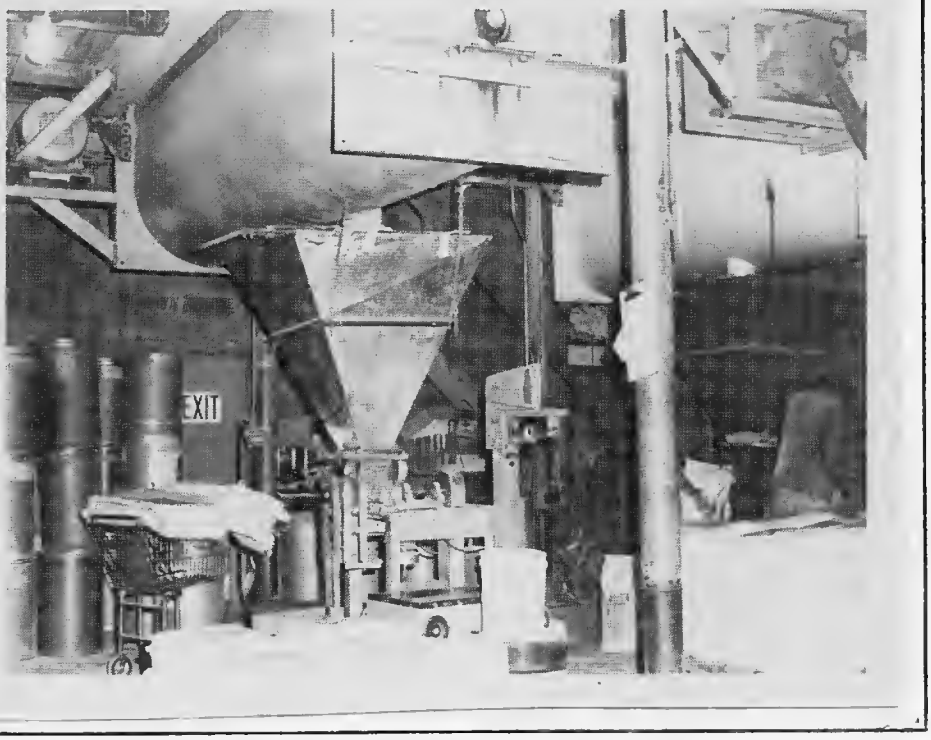


Exhibit A7 -- View of mixer #3 from bottom, showing chute with weighing/bagging equipment. Mixer #4 is to the right.

Exhibit A8 -- Moveable switch box for controlling mixer #3 from weighing/bagging station. Buttons are start, jog, and stop (left to right).